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from the point *c* to the points *f* and *g*. Through the point *c* draw a right-hand isometrical line *h c i*, and through the same point a left-handed isometrical line *j c k*. Take the distance of four divisions in the line *a d*, Fig. 2, from the point *a*, and set it off from the point *c*, Fig. 4, to the points *h i j k*. Through the points *d*, *g*, *f*, *i*, *e*, *k*, *g*, and *h*, draw by hand the curve of the ellipse. By far the greater portion of the curve may be described by the compasses—these eight points being first obtained as above described—the centres of the parts *j f i* and *h g k* being found in the line *f g* produced at *l* and *m*, and the parts *h d j* and *k e i* at *n* and *o*. These curves described by the compasses will not meet, but the short portion of the ellipse not described by the compasses can very easily be drawn by hand. Fig. 5 shows the projection of the same circle, of which the major axis *d c e* is in a right-hand isometrical line. Fig. 6 is the same circle projected on a left-hand isometrical line. The same letters of reference and description apply to those two figures as in Fig. 4.

We have now given a number of examples from which the reader has been able, we hope, to gain a pretty fair notion of the mode of drawing a variety of forms within cubes. The more thoroughly the describing of forms *within cubes* is understood, the more easy will be his practice in another branch of the art, to which we now direct his attention, and in which the tedious modes of obtaining the *direction* and the exact *proportion* of isometrical lines already described are dispensed with, and a mode as simple as it is practically useful is substituted.

In Fig. 5, Plate 15, we gave the mode of constructing an isometrical ruler, *a f b*, of which both sides are angular; we also show in same figure another form of ruler, having one perpendicular side, the angle being, of course, the same as the angle *a f e*, or *b e f*. The reader desirous to practise this species of delineation should construct scales and rulers of convenient sizes of both these forms, and cut them out of black walnut or mahogany. We now propose to explain the mode of using the isometrical rulers. This must be done in conjunction with the common drawing-board and T square, so familiar to all who know any thing about architectural drawing.

Let the line *a b*, Fig. 7, Plate 31, represent the upper edge of the T square, which is supposed to be laying along the drawing-board. Take any point *c*, and moving the isometrical ruler, as in Fig. 5, Plate 15, along the edge *a b* of square till the point coincides with the angular edge of the ruler, draw through the point *c* a line along its edge, as *c d*; this will be a right-hand isometrical line. Move the ruler along the edge of the square till the angle points the other way, and till its edge coincides with the point *c*, through which draw a line *c e*; this will be a left-hand isometrical line. Let *c f* be the length of one of the sides of a cube which it is desired to draw. Set off from *c* on the lines *c d*, *c e*, this distance to the points *f* and *g*. Adjust the ruler till the angular edge coincides with the points *f* and *g*, through which draw lines meeting in the point *h*; *c f h g* is the upper side of the cube. From *f h* and *g* draw perpendicular lines parallel to the diagonal *c h*. Lower the edge of square *a b* till it is at a point, say *i j*. Then make *h l* equal to *c f*, and adjusting the ruler till its edge coincides with the point *b*, draw isometrical lines along its edge, joining *f k*, *c m*, in the points *k m*. The cube is thus completed.

(To be continued.)

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The Sectorian System of Hand-Railing.

FOURTH PAPER.

On Plate 26 is shown a platform stairs, with the landing and starting riser on a line with the chord of the cylinder, placing the whole of the cylinder in the platform, thus avoiding the additional labor of curving the nosings, as when worked in the cylinder and thrown partly in the platform. Here the platform is clear of that objection, and all the balusters of the wreath gracefully encircle around the cylinder and find their landing-place on the floor of the platform.

It will be seen that this plate shows a cylinder two feet diameter, and the objection often urged by stair-builders is, that the wreath rises too high for the half riser at the centre of the cylinder, and therefore the steps in the platform cannot be avoided. I claim that, according to the Sectorian System, the difficulty is entirely removed, and the wreath-pieces as easily worked out as any other part of the rail, when properly understood. The wreath-pieces are not required to be any wider in one part than another, and no thicker than the width of the rail in any part. The falling moulds for wreaths in late years have fallen into disuse and are eschewed by most authors on the subject of hand-railing, and I have been uncharitable enough to think it a want of knowledge as to the right use of those moulds, which to this system are indispensable. The wall-string shows my method of bending and keying the same. On other plates it is shown how this wreath is worked.

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Hand-Railing.

GEO. W. LONGSTAFF.

Plate 27 represents a flight of stairs with seven windows forming a half circle, with flyers above and below.

Fig. 1 shows the ground plan and elevation of risers, the pitch lines and development of tangents for face mould; the upper and lower pitch being the same, only one face mould is required. The mould is simply reversed in application, as shown by Figs. 2 and 3.

Further explanation would be unnecessary here. Careful study of the plate, and occasional reference to last year's plates in the American Builder, is all that is necessary to enable the student to thoroughly understand it.

(*To be Continued.*)

[In compliance with a request made by a number of our subscribers, we have transferred these valuable articles to the Wood-Worker, in which paper the series will be continued until completed.—Ed.]

Correspondence.

We invite communications from our readers in matters connected with the trades we represent. Be brief, courteous, and to the point.

Editor of Wood-Worker:

I am very much pleased with the Wood-Worker, and so are all my friends that have seen it; the last number was particularly good and rich. The papers on Carpentry and Handrailing are very valuable to me, and I suppose to others as well.

I would like to say a word to "Newark" and a "Subscriber from Mississippi" concerning their guess cutting. We have plenty of guess wood-butchers in Wisconsin, and a sorry lot they are. The trades would have a much better reputation if all guess mitre-cutters were respectably interred.

Some of these wood-mutilaters in this neighborhood never served a day at a trade, and are as ignorant of the use of mechanics' tools as a Fejee Islander is of the planetary motions; but they have brass and impudence enough to persuade people that they, the "guess men," are master mechanics; and these men will often undertake to do work, on the shortest notice, that experienced mechanics will hesitate about before taking in hand; but we are told on good authority that:

"fools rush in
Where angels fear to tread."

It is quite evident that such men work for gain altogether, and have no pride in the trade or desire to become skilled, only so far as it may tend to fill their pockets; but there is something wrong when men without tools and without training are permitted to compete with skilled mechanics who have spent hundreds of dollars in tools and time in acquiring the skill they possess; in fact, it is a question whether it is worth while to learn a trade or not, as it appears to me that the unskilled stands a better chance of making a living than the man who fritters away his best days in learning a trade the public refuse to appreciate. Apprentice.

Hammond, Wis., March 17, 1879.

Editor of the Illustrated Wood-Worker:

Your elegant little paper has just come to hand, and I am delighted with it. The designs of furniture shown in the February and March numbers are excellent. I intend making a sideboard from the design shown on Plate 19, which I think is a very scholarly piece of work. The wardrobe shown on Plate 24 is a perfect gem of simplicity and appropriateness, and when I get time I will put Mr. Fieder's idea of a wardrobe into tangible shape.

I herewith tender my thanks to the gentleman named for the design, as I am the person who asked for it under the name of

Ned.

Waco, Texas, March 12, 1879.

[For want of space we are obliged to hold over a number of interesting communications.—Ed.]

Intercommunication.

This department is intended to furnish, for the benefit of all our readers, practical information regarding the art of manipulating wood by hand or machinery; and we trust that every reader of our paper will make the fullest use of it, both in asking and answering. All persons possessing additional or more correct information than that which is given relating to the queries published, are cordially invited to forward it to us for publication. All questions will be numbered, and in replying it will be absolutely necessary, in order to secure due insertion, that the number and title of the question answered should be given; and in sending questions, the title of key-words of the question should be placed at the head of the paper. Correspondents should in all cases send their addresses, not necessarily for publication, but for future reference. We also request that all questions or answers be written on separate slips of paper, and addressed to the Editor. Notes of practical interest will be welcome at all times. When drawings are sent to illustrate answers to questions, or for full pages, they should be on separate slips, and should be drawn in ink on clean, white paper. Short questions, requiring short answers, may be asked and answered through the agency of postal cards.

When answers to questions are wanted by mail, the querist must send a stamp for return postage.

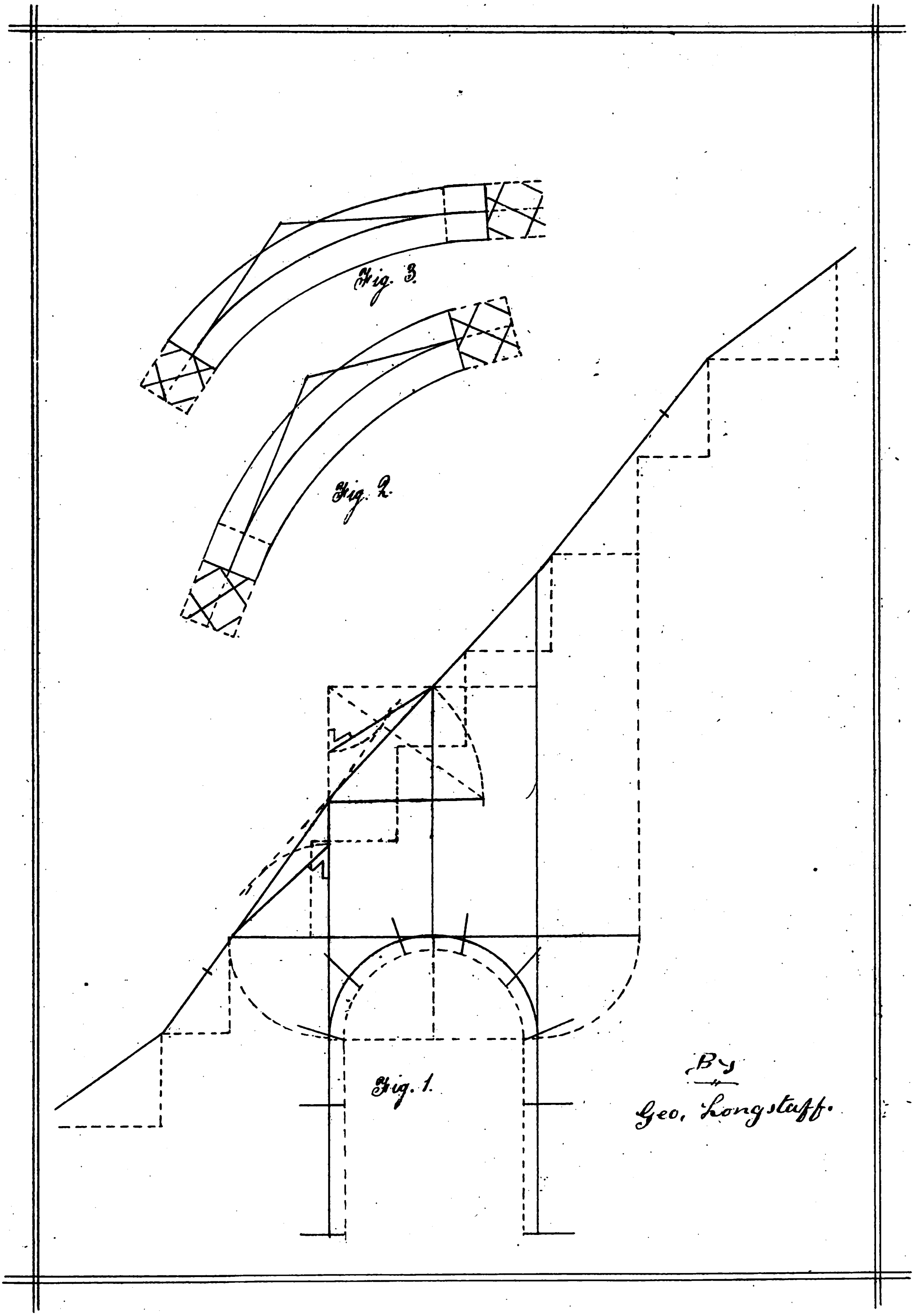
Queries.

18. Mirror.—Can any of your readers acquaint me with some method whereby I can recoat a mirror that has had a portion of the silvering taken off? Information on this subject will be appreciated by—John Healt.

19. Bench.—I would like very much if some reader would send you, for illustration in the Wood-Worker, a design for a handy and complete joiner's work-bench. I would like it fitted up with head and tail-screws.—Gouge.

20. Railing.—Would some of your clever readers be kind enough to publish a design for a wooden railing to go round a grave? I

PLATE 27.



HAND-RAILING.